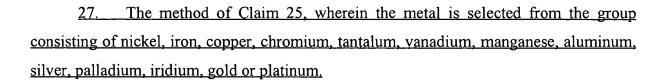
- 18. The method of Claim 16, wherein the step b) is conducted with the temperature of the substrate kept at about 600°C or lower.
- 19. The method of Claim 18, wherein the step b) is conducted in an ambient of plasma.
 - 20. The method of Claim 19, wherein the plasma comprises nitrogen plasma.
- 21. The method of Claim 16, further comprising the step of c) forming a p-side electrode out of a metal on the semiconductor layer after the step b) has been performed.
- 22. The method of Claim 21, wherein the step c) comprises annealing the p-side electrode at about 400°C or lower after the p-side electrode has been formed.
- 23. The method of Claim 22, wherein the step c) comprises exposing the semiconductor layer to a plasma after the p-side electrode has been formed.
- 24. The method of Claim 16, wherein the dopant is selected from the group consisting of magnesium, zinc, calcium, strontium, beryllium, cadmium, mercury and lithium.
 - 25. A method for fabricating a semiconductor device, comprising the steps of:
- a) forming a semiconductor layer of a Group III nitride containing a dopant over a substrate:
 - b) forming a p-side electrode out of a metal on the semiconductor layer; and
- c) applying RF power on the semiconductor layer, thereby making the conductivity type of the semiconductor layer p-type.
- 26. The method of Claim 25, wherein the step b) is conducted with the temperature of the substrate kept at about 600°C or lower.



- 28. The method of Claim 25, wherein the metal is a hydrogen-storing metal selected from the group consisting of titanium, magnesium, calcium, zirconium, lanthanum, niobium, vanadium, nickel, iron, manganese, cobalt, chromium and aluminum.
- 29. The method of Claim 25, wherein the step b) comprises forming a hydrogen-absorbing layer out of a hydrogen-storing metal on the semiconductor layer before the p-side electrode is formed.
- 30. The method of Claim 29, wherein the hydrogen-storing metal is selected from the group consisting of titanium, magnesium, calcium, zirconium, lanthanum, niobium, vanadium, nickel, iron, manganese, cobalt, chromium and aluminum.
- 31. The method of Claim 25, wherein the step c) is conducted in an ambient of plasma.
- 32. The method of Claim 31, wherein the ambient of plasma comprises nitrogen plasma.
 - 33. A method for fabricating a semiconductor device, comprising the steps of:
- a) forming a semiconductor layer of a Group III nitride containing a dopant over a substrate; and
- b) after introducing the substrate into a vacuum chamber, charging plasma into the vacuum chamber to form an ambient of plasma while keeping the temperature of the substrate at about 600°C or lower, thereby making the conductivity type of the semiconductor layer p-type.

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- 34. The method of Claim 33, wherein the ambient of plasma comprises nitrogen plasma.
- 35. The method of Claim 33, further comprising the step of c) forming a p-side electrode out of a metal on the semiconductor layer after the step b) has been performed.
- 36. The method of Claim 35, wherein the step c) comprises annealing the p-side electrode at about 400°C or lower after the p-side electrode has been formed.
- 37. The method of Claim 36, wherein the step c) comprises exposing the semiconductor layer to a plasma after the p-side electrode has been formed.
- 38. The method of Claim 33, wherein the dopant is selected from the group consisting of magnesium, zinc, calcium, strontium, beryllium, cadmium, mercury and lithium,
 - 39. A method for fabricating a semiconductor device, comprising the steps of:
- a) forming a semiconductor layer of a Group III nitride containing a dopant over a substrate;
 - b) forming a p-side electrode out of a metal on the semiconductor layer; and
- c) after introducing the substrate into a vacuum chamber, charging plasma into the vacuum chamber to form an ambient of plasma while keeping the temperature of the substrate at about 600°C or lower, thereby making the conductivity type of the semiconductor layer p-type.
- 40. The method of Claim 39, wherein the metal is selected from the group consisting of nickel, iron, copper, chromium, tantalum, vanadium, manganese, aluminum, silver, palladium, iridium, gold or platinum.
- 41. The method of Claim 39, wherein the metal is a hydrogen-storing metal selected from the group consisting of titanium, magnesium, calcium, zirconium,



lanthanum, niobium, vanadium, nickel, iron, manganese, cobalt, chromium and aluminum.

- 42. The method of Claim 39, wherein the step b) comprises forming a hydrogen-absorbing layer out of a hydrogen-storing metal on the semiconductor layer before the p-side electrode is formed.
- 43. The method of Claim 42, wherein the hydrogen-storing metal is selected from the group consisting of titanium, magnesium, calcium, zirconium, lanthanum, niobium, vanadium, nickel, iron, manganese, cobalt, chromium and aluminum.

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